

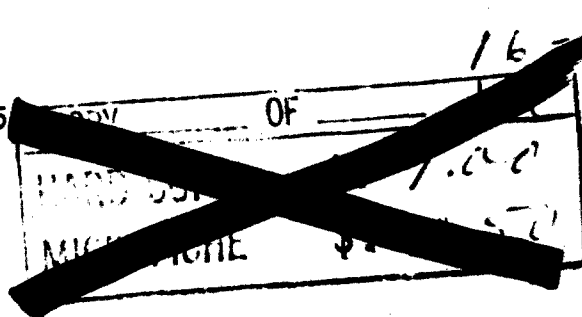
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Technical Report

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PIONEER POLAR STRUCTURES  
JAMESWAY PICTURE WINDOW

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U. S. NAVAL CIVIL ENGINEERING LABORATORY  
Port Hueneme, California

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# PIONEER POLAR STRUCTURES — JAMESWAY PICTURE WINDOW

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by

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## ABSTRACT

A picture window was developed for use in the side of a Jamesway polar shelter. It is placed in a dormer of plywood and wood framing that fits between two Jamesway arch ribs. Windows can be placed side by side in any quantity to provide the desired width. Double plate glass is used in the standard window, but a hermetically sealed, triple-glass unit can be used as an alternate. Two prototype picture windows were in-service tested at the NCEL experimental camp near McMurdo, Antarctica. One window was used in the office; the other was used in the mess hall. It was concluded that the picture window satisfies the requirements for a window in the side of a Jamesway and can be used as a standard accessory for the Jamesway.

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Release to the Clearinghouse is authorized.

The Laboratory invites comment on this report, particularly on the results obtained by those who have applied the information.

## INTRODUCTION

The desirability of windows in polar buildings has always been a point of contention. They increase the heat loss and present problems of controlling light for sleeping in areas where there are 24 hours of daylight. However, there are many places, such as lounges, offices, and mess halls where round-the-clock daylight is not objectionable. In such locations, windows would create a more pleasant environment.

The Jamesway shelter, widely used in polar camps, has windows only in the endwalls. These are quite small and are above eye level when the wall extensions are used. A picture window in the side of the Jamesway would be convenient, but the arches formed by the walls and roof do not permit the use of a conventional window. By using a dormer fitted between two arch ribs, a window can be installed in the side of a Jamesway.

This report presents the development of a picture window for the side of a Jamesway and describes in-service test of two prototype windows at the NCEL experimental camp near McMurdo, Antarctica.

## BACKGROUND

In 1962, the design was completed for a packaged 25-man polar camp<sup>1,2</sup> with a life of 3 months to 2 years. This design was based on existing knowledge and limited field tests of certain components. After the design was completed, other components were tested.

Construction of an experimental camp on the Ross Ice Shelf near McMurdo, Antarctica, was started in November 1962 in order to test components of the camp more completely and to investigate other possibilities for improving the camp design. The experimental camp was occupied during the summer seasons by technical and support personnel conducting snow compaction studies, sea ice investigations, and other studies relating to construction in polar regions.

In January 1964, construction of a 64-foot Jamesway quarters building for the experimental camp was completed. Plans were made to use part of this building during the following season for an office which would be divided from the quarters by a solid partition.<sup>3</sup> This office presented an excellent location for a picture window because the light would not disturb anyone sleeping, and the view would relieve the confined feeling for office personnel who must remain indoors most of the time.

Picture windows have been field-fabricated for Jamesways; however, there has been a need for a prefabricated window for reduced cost and greater convenience.

## PICTURE-WINDOW CRITERIA

The criteria established for the design of the view window were based on experience in developing other accessories for Jamesways.<sup>4,5</sup> Criteria were as follows:

1. Easy installation in any bay on the side of a Jamesway with wall extensions.
2. Simple and fast to erect without special tools or equipment.
3. Installed with a minimum of alterations to the building.
4. Reasonably airtight and low in heat transmission.
5. Large enough for visibility while occupants are sitting or standing.
6. Easy fabrication in small shops.

## DESCRIPTION

The Jamesway picture window (Figure 1) is detailed in Y&D Drawing No. 993770. Copies of this drawing are available from NCEL. Specifications and a reduced scale drawing are presented in the Appendix.

The picture window is set into a dormer which can be placed in the side of a Jamesway with wall extensions. One unit is 3 feet 10-1/2 inches wide to fit between two arch ribs. Any number of units can be placed side by side for the desired width. The top of the window is 6 feet 3-7/8 inches above the floor. The standard window is double 1/4-inch plate glass, but a hermetically sealed, triple-glass unit can be used in locations where weather conditions are severe.

The sides of the dormer (Figure 2) are 3/4-inch plywood with two-by-two members on the edge of the inside face for connecting it to the window frame and the roof. The outside face of the plywood is fitted with a 1-inch-wide band of 1/4-inch plywood and 1/8-inch felt curved to fit the arch and act as a gasket between the plywood and the arch. The plywood is secured to the arch with 1/4-inch carriage bolts. Bolt holes are predrilled through the plywood sides and gasket, and match-drilled (Figure 3) through the arch rib at the time of erection.



Figure 1. Jamesway picture window.



Figure 2. Side of dome installed in a Jamesway.



Figure 3. March-drilling of the arch rib with the domer side.

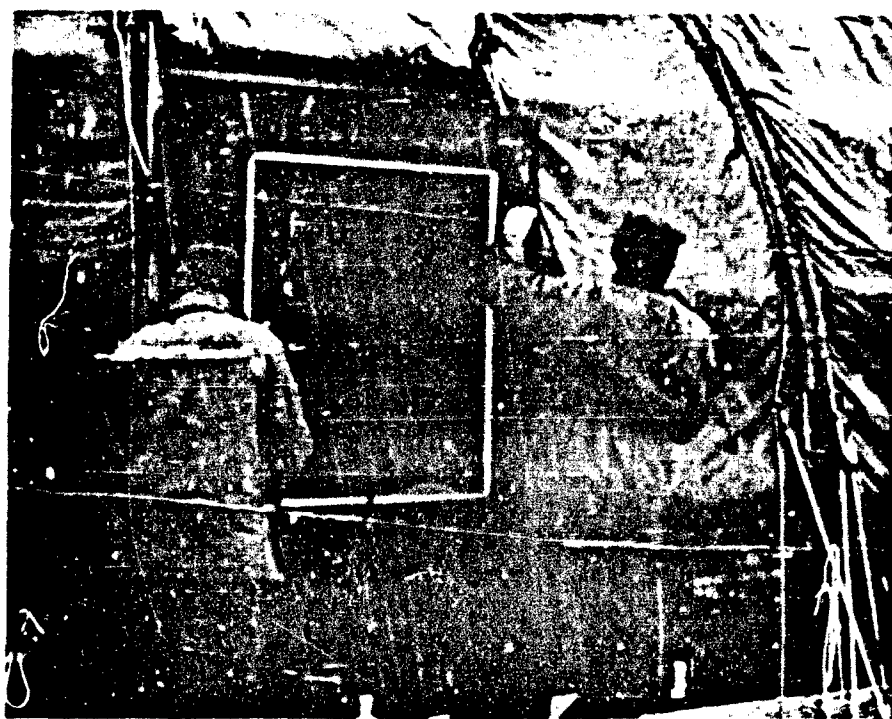


Figure 4. Securing window to dormer sides with screws.

The window frame is constructed of two-by-fours. Glass is held in place on the inside with one-by-two stops. Quarter-round stops secure the glass on the outside. The window is sealed completely around its perimeter, both inside and out, with a nonhardening glazing compound, and a desiccant is placed between the two glasses. The bottom of the frame is secured to the wall extension with screws. The sides are secured to the two-by-two members on the dormer with screws (Figure 4).

The top of the dormer is 3/4-inch plywood. Screws secure it to the top of the window frame and to the two-by-twos at the top of the plywood sides of the dormer. A quarter round is nailed over the joint between the window frame and the roof.

The roof blanket, removed to make room for the window (Figure 5), is folded, placed on top of the dormer, and held in place by a tie-down assembly. The tie-down consists of four straps and a wooden bar which is hinged at the center and has metal teeth on each end. The bar is placed between the arches directly above the top of the dormer and is straightened so the teeth bite into the arch ribs. Three of the straps are secured to the bar and are pulled over the folded blanket to fasten with hook buckles into holes at the front of the dormer. A fourth strap, perpendicular to the three, has a hook buckle on each end which fastens into holes in the sides of the dormer.

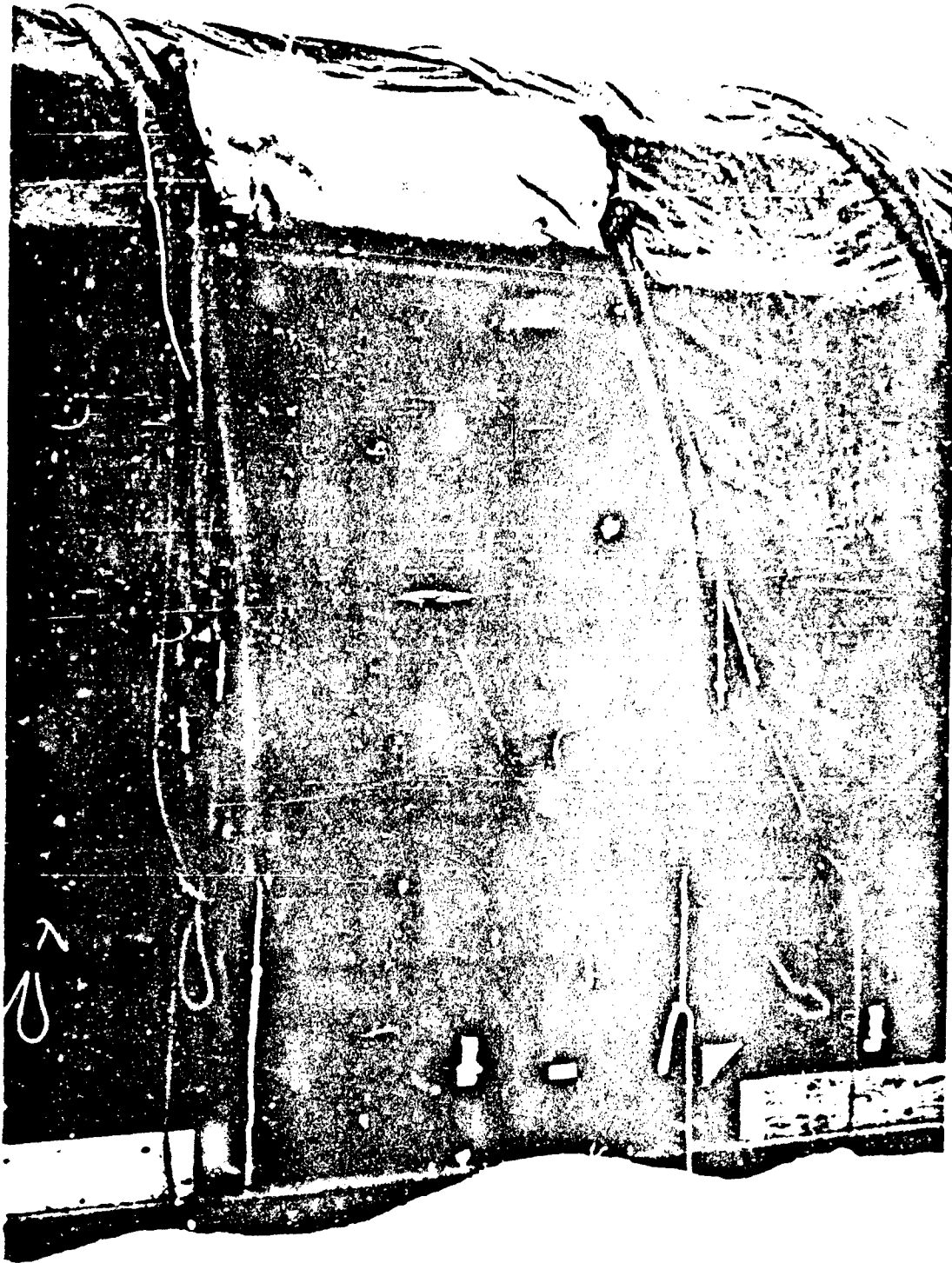


Figure 5. Roof blanket rolled back to make room for the window.

Based on the expense of fabricating prototypes at NCEL in 1964, one picture window costs \$280. A hermetically sealed, triple-glass unit would add \$100 to the cost, making the total cost \$380. Packaged for shipment, the picture window weighs 335 pounds and occupies 24 cubic feet.

## EVALUATION

Two prototype picture windows were fabricated and shipped to the NCEL experimental camp near McMurdo, Antarctica. They were installed for an in-service test in February 1965. One window was placed in the office (Figure 6); the other one was placed in the mess hall. Both windows provided a view of the camp courtyard.

The windows were installed quickly and easily. After experience was gained by installing one, the second one was installed in 4 manhours. All parts fitted quite well, and with only four major components, there was little room for confusion.

There was some difficulty in sealing the joints between the window components and around the dormer. The design was modified to provide a 1/8-inch felt strip at all joints, and a quarter round was added for the joint between the window frame and the roof. The felt is glued to one component at the time of fabrication. The joint on each side of the dormer is no problem if the blanket tie-downs are properly secured and the blankets are fitted around the arch ribs.

In the office, the double-glass window with desiccant presented no condensation problem at temperatures down to 0°F. At temperatures of 0°F to -8°F, there was a small amount of condensation between the two glasses. In the mess hall where there was more moisture from cooking, condensation occurred at temperatures below 10°F. No temperatures below -8°F were experienced.

The windows created a more pleasant environment. The dormers blended well with the Jamesway structure and appeared to be a part of the basic Jamesway rather than an appendage or an afterthought. The only objection to the windows was that they allowed entrance of glare from the bright sun and reflection off the snow. Tinted glass or a tinted plastic sheet over the existing glass could be used to avoid the glare.

A blind would be convenient when the sun is low and shining directly in the window. There are also applications which require blackout curtains to darken the room. The mess hall in the experimental camp was an example of this. Movies were shown in the mess hall each evening, requiring that the room be completely darkened. A sheet of cardboard was used to cover the window; but a blind which could be left in place and rolled up or down would be more convenient.

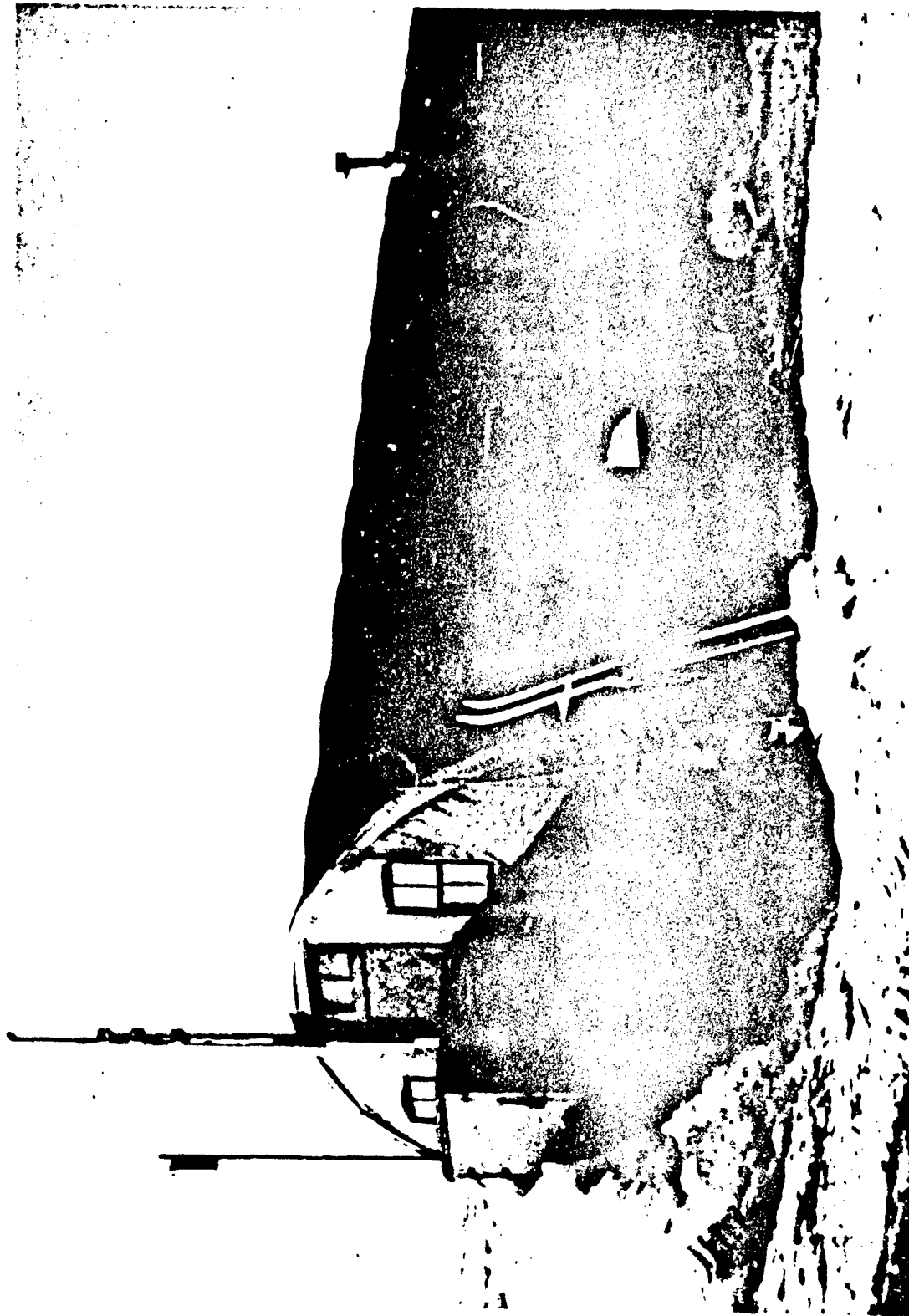


Figure 6. Picture window installed in the office at the NCEL experimental camp near McMurdo, Antarctica.

## FINDINGS

The following findings summarize the evaluation of the Jamesway picture window:

1. It can be installed in any bay of a Jamesway without altering or damaging the basic building.
2. It can be installed quickly and easily without special tools or skills. Installation requires 4 manhours.
3. It can be easily fabricated in small shops.
4. It blends well with the basic Jamesway structure.
5. The window costs \$280, based on 1964 laboratory fabrication prices.
6. It weighs 335 pounds and occupies 24 cubic feet packaged for shipment.

## CONCLUSION AND RECOMMENDATION

1. The picture window satisfies the requirements for a window in the side of a Jamesway.
2. The picture window should be used as a standard accessory for the Jamesway.

## Appendix

### SPECIFICATIONS FOR THE JAMESWAY PICTURE WINDOW

The standard specifications given in the following list or mentioned elsewhere herein shall govern in all cases where references to standard specifications are made. In case of difference between the listed standard specifications and the subsequent specification or its accompanying drawing, the subsequent specification or its accompanying drawing shall govern. Special care shall be exercised to refer to the standard specifications and to all modifications thereof in requests for quotations and in orders.

#### Military

MIL-A-46051	Nov 20, 1961	Adhesive, room temperature and intermediate temperature setting resin (phenol, resorcinol, and melamine base)
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#### Federal

DD-G-451a	June 15, 1951	Glass, flat and corrugated, for glazing mirrors, and other uses
FF-N-105a	July 26, 1963	Nails; wire; and staples
FF-S-111b	May 15, 1961	Screws, wood
NN-P-530a	Nov. 2, 1961	Plywood, flat panel
QQ-P-416a	Dec. 1, 1961	Plating, cadmium (electrodeposited)
TT-E-529a	Oct. 30, 1959	Enamel, alkyd, semigloss
TT-P-636b	Feb. 23, 1954	Primer coating, synthetic, wood and ferrous metal

#### Non-Government

All of the following specifications shall be of latest date unless indicated otherwise:

Douglas Fir Plywood Association

West Coast Lumbermen's Association Grading Rules No. 15

1. Scope. The work shall include the furnishing of all material and equipment and performing of all labor for the complete fabrication of the items indicated on Y&D Drawing No. 993770 and described and specified herein. The contractor's proposal shall be based on the drawings and specifications herewith, and no deviations shall be accepted except as approved in writing by the Contracting Officer.

2. Materials

A. Wood

(1) Lumber. All lumber shall be kiln dried Douglas Fir, conforming to WCLA Grading Rules No. 15, Paragraph 184-b, flat grain.

(2) Plywood. Plywood shall be Douglas Fir, exterior type, Grade A-B, and shall conform to Specification NN-P-530a.

B. Fastenings

(1) Nails. The nails shall be steel, cement coated, either standard or countersunk head and of a size as indicated on the drawings, and shall conform to Specification FF-N-105a.

(2) Screws. Wood screws shall be cadmium plated, of the size and type indicated on the drawings, and shall conform to Specification FF-S-111b.

(3) Adhesive. The adhesive used for adhering wood to wood (other than the manufacture of plywood) shall be "room temperature resorcinol glue" (synthetic resin type) applied in accordance with manufacturer's instructions, and shall conform to Specification MIL-A-46051.

C. Glass

(1) The glass shall conform to Specification DD-G-451a, Type II, B quality.

D. Coating

(1) Cadmium Plating. The plating shall conform to Specification QQ-P-416a, Class I, Type II.

E. Paints

(1) Primer. The primer shall conform to Specification TT-P-636c.

(2) Enamel. The enamel shall conform to Specification TT-E-529a, Class A.

3. Fabrication. All wood joints shall be glued in addition to being joined mechanically. Holes shall be drilled where necessary to prevent splitting of wood. Felt strips shall be glued to one member at the time of fabrication. All exposed wood surfaces shall be painted with one coat of primer and two coats of enamel.



## REFERENCES

1. U. S. Naval Civil Engineering Laboratory. Technical Report R-267: A 25-man pioneer polar camp, by G. E. Sherwood. Port Hueneme, Calif., 16 Oct. 1963.
2. ———. Technical Note N-500: Specifications for a 25-man pioneer polar camp, compiled by G. E. Sherwood. Port Hueneme, Calif., 28 June 1963.
3. ———. Technical Report R-383: Pioneer polar structures - Jamesway building divider, by G. E. Sherwood. Port Hueneme, Calif., May 1965.
4. ———. Technical Report R-241: Pioneer polar structures - accessories for the Jamesway shelter, by G. E. Sherwood. Port Hueneme, Calif., 28 May 1963.
5. ———. Technical Note N-482: Pioneer polar structures - specifications for Jamesway shelter accessories, compiled by G. E. Sherwood. Port Hueneme, Calif., 15 April 1963.